

The environmental benefits of the Extended Northern Runway at Heathrow

November 2020

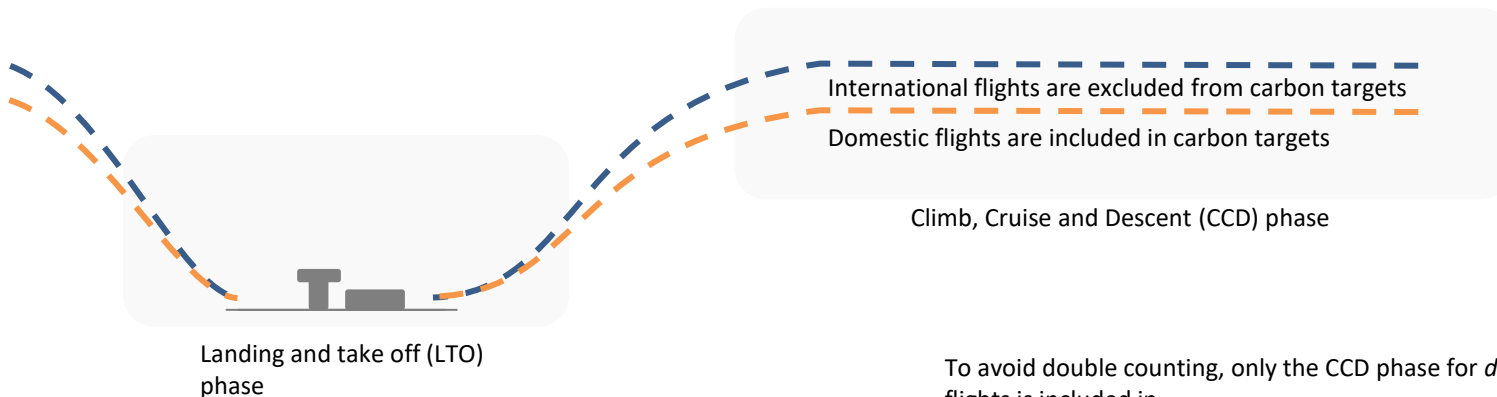


An Extended Runway would reduce Heathrow and airline emissions by over a third

- Adding capacity at Heathrow – without increasing flights – will:
 - reduce congestion, improve operational efficiencies and therefore reduce airline fuel use and aircraft emissions
- Extending the Northern Runway will deliver this capacity and reduce emissions from aircraft operations at Heathrow by 37%
- It is positive both for the environment and financially

Environmental impact of air transport

- Aircraft contribute to greenhouse gases such as Carbon Dioxide (CO₂)
 - CO₂ is produced from burnt fuel
 - Heathrow's annual CO₂ emissions due to aircraft operations is about 20 million tonnes of CO₂ for the LTO and CCD phases (see opposite)
- Aircraft also produce Nitrogen Oxides (NO_x)
 - NO_x is created during combustion in engines and can have health impacts
 - Heathrow's annual NO_x emissions are around 4700 tonnes
- The UK has committed to 'Net Zero' greenhouse gases (GHG) by 2050
- Calculation of GHG from aviation is divided into international and domestic flights, and LTO (landing and take-off) and CCD (climb, cruise, descent) phases
- The UK's target excludes all international flights, although in June 2020 the CCC recommended that international aviation and shipping should be included within UK climate targets
- Heathrow airport's contribution towards the UK GHG total is about 0.2% excluding international flights. It would be about 4% if international flights were included



To avoid double counting, only the CCD phase for *departing* international flights is included in emission measurements (arrivals are allocated to the country of origin)

Aviation needs to act to reduce its climate impact

- Aviation is a major contributor to environmental emissions
- Even without growth, the industry needs to demonstrate carbon reductions to secure the right to operate and financial investments
- Heathrow is the largest airport in the UK with a measurable impact on GDP
- It is also the most congested airport in Europe.
- Alleviating congestion will reduce emissions
- Heathrow can only have a limited impact on new aircraft designs, but it can have a major impact on its own congestion
- Future government policy measures like Carbon Caps will put pressure on the sector so it needs to act now
- NOx at the airport is a potential capacity constraint due to legal air quality limits
- Reducing emissions at Heathrow would
- Support government and international efforts to address climate change (Climate Change Act) and especially deliver a Net Zero Carbon economy
- Ensure compliance with regulatory limits (local air quality)
- Ensure planning approval for continuing growth
- Facilitate political support for and reduce community opposition to airport growth
- Release environmental capacity constraints at Heathrow airport
- Reduce airline operating costs (fuel use)

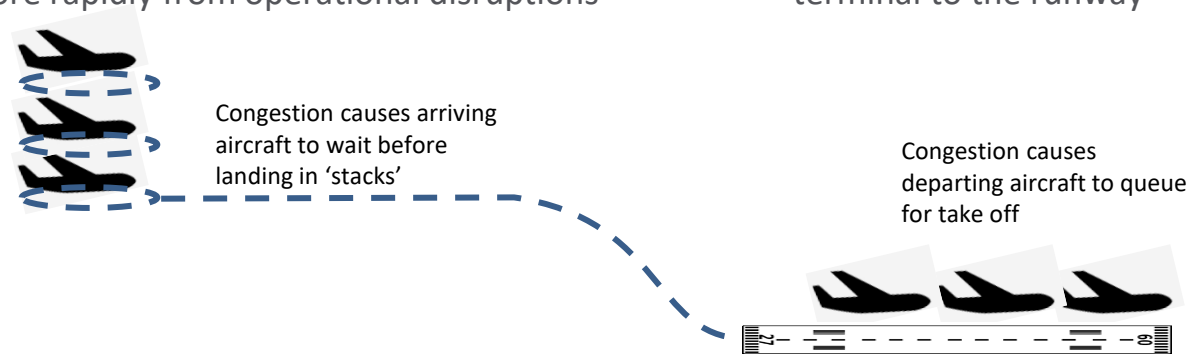
The Extended Northern Runway (ENR)

- ENR is a scheme to extend the Northern Runway at Heathrow to split it into two runways
- This report compares the existing 2 runway configuration (2R) with an Extended Northern Runway (ENR) configuration
- The comparison is for the same number of flights per year (480,000) – i.e. no increase in the number of flights
- No new terminals or changes to the ground layout are assumed except for the new runway and taxiways
- The analysis uses standard modelling and an industry-recognized approach to calculate the impact of extra capacity
- Analysis is based on typical days in summer 2019 and on current operations, eg daily runway alternation
- These slides focus on CO₂ and NO_x, but other emissions (e.g. particulates, Sulphur Oxides and Ozone) are also reduced



How can a new runway reduce Heathrow's environmental impact?

- Heathrow's runways are heavily congested which creates queues of aircraft, both before landing and taking off
- The ENR runway provides more capacity that reduces these delays - like opening an extra checkout at the supermarket
- The benefits arise primarily from alleviation of operational capacity constraints and the ability to recover more rapidly from operational disruptions
- The reduced delays save fuel, reduce environmental emissions, cut journey times for the passengers and reduce flight costs for airlines
- The airport would have more resilience since it could recover more quickly from disruptions – thus it would also reduce cancellations
- The ENR runway also reduces some taxi distances so that aircraft don't have to taxi so far from the terminal to the runway



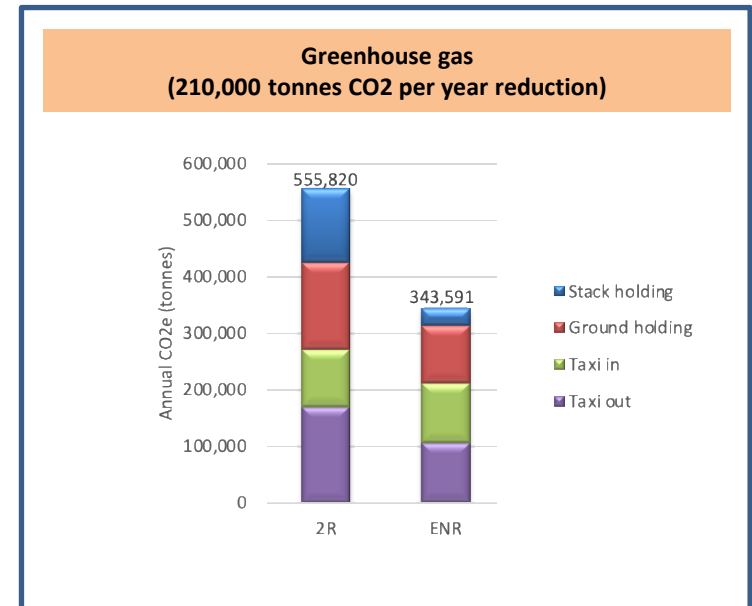
Heathrow compared to other European airports

- Heathrow is heavily congested compared to other major European airports due to its fewer number of runways
- For example, average additional taxi out time due to congestion is 8.9 min at Heathrow compared to 3.1 at Amsterdam, 3.9 at Frankfurt and 3.8 at Paris Charles de Gaulle*
- The ENR reduces the Heathrow taxi out time by over 4 minutes

Source: Eurocontrol

CO2 reduction

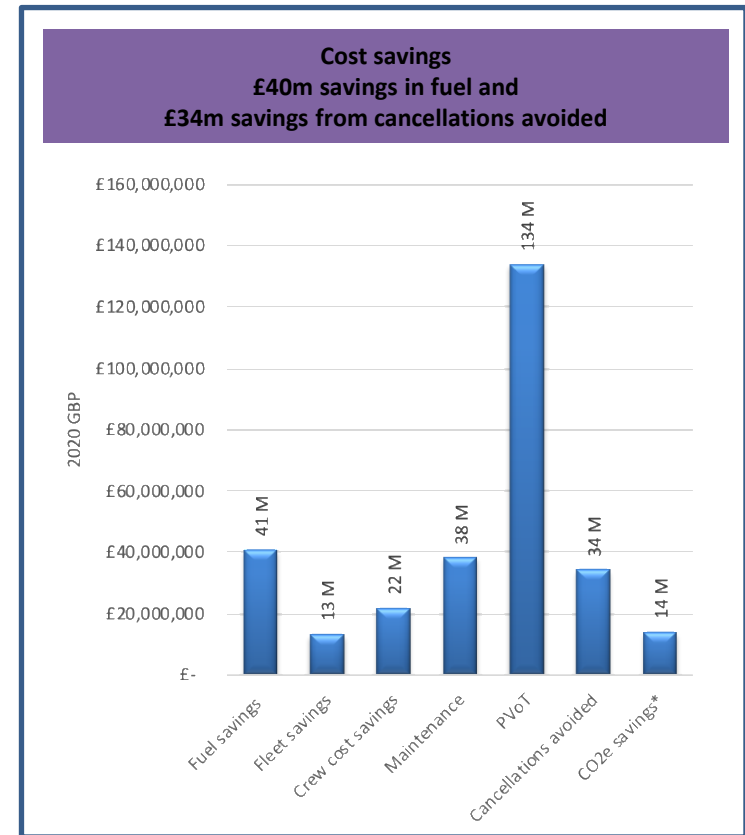
- The ENR runway would reduce Heathrow emissions by 210,000 tonnes of CO2 per year *
- This comes from a reduction of about 67,000 tonnes of fuel per year due to reduced holding in the air and on the ground
- It is a 38% reduction of the CO2 emissions from aircraft during their holding and taxiing operations
- It is a 10% reduction in emissions from local operations at Heathrow when buildings and surface access are included
- As noted before, this assumes no increase in flight numbers and it is primarily because of reduced airborne and ground holding
- Building the new runway also generates CO2 from construction activity and the materials used. This is likely to be less than 500,000 tonnes of CO2. The annual CO2 reductions would exceed this figure within a few years



* The derivation of these and other figures is given in the detailed technical report

Saving time and money

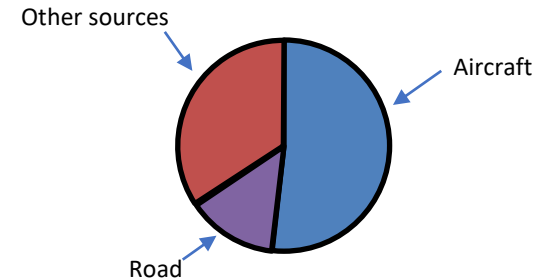
- Reducing delays also saves time and money and journeys become shorter
- Passengers save time in shorter flights, airlines save fuel and flying costs, and there are fewer cancellations
- Each flight becomes over 3 minutes shorter on average - about 4 minutes delay is removed for each departure and about 2.5 minutes for each arrival
- On disrupted days (e.g. with bad weather), the time savings will be much larger, and many cancellations will be avoided
- In total, 2.5 million minutes of aircraft time at Heathrow are saved every year
- Altogether the reduced delays save almost £300m per year to airlines and passengers
- Airlines would save around £150m in direct costs per year
- Passenger value of time (PVoT) saved is worth £134m per year
- There will also be savings in future airline carbon credit costs
- Since the cost of building the ENR is £4.3bn, the project benefit outweighs this cost after 15 years of operation



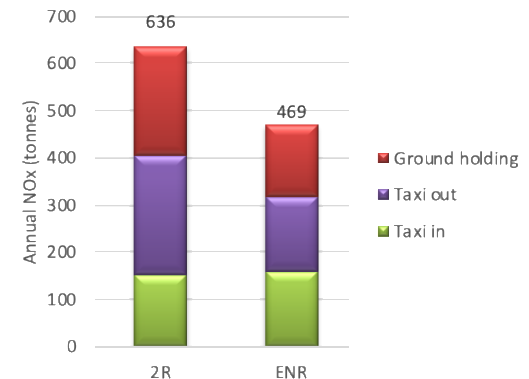
Local air quality

- At Heathrow, aircraft cause about half of the NO_x emissions. Road vehicles are the next largest single source
- Heathrow's own report show the impact of the airport to be lower but that is because they class some airport-caused emissions as 'background'
- The additional runway would reduce NO_x by 167 tonnes per year
- Again it is primarily because of reduced taxi distance for departures and ground holding
- Other emissions such as particulates, Sulphur Oxides and Ozone would be similarly reduced
- This is about 37% of the NO_x produced during ground holding, taxi out and taxi in
- However, it is only about 3.6% of the Heathrow total NO_x, as most NO_x is produce during aircraft take-off and climb out

Sources of NO_x emissions at the centre of Heathrow airport
DEFRA Modelling for 2018



Local Air Quality
(167 tonnes NO_x a year reduction)



Summary

- Heathrow is current heavily congested which causes aircraft to be delayed on the ground and in the air
- The Extended Northern Runway (ENR) would reduce this congestion, saving 67000 tonnes of fuel per year and reducing average flight time by over 3 mins – much higher in congested times
- This leads to a reduction of 210 000 tonnes of CO2 per year and 167 tonnes of NOx
- It would deliver about £300M financial benefits, including nearly £150M yearly savings to airlines and £134M to passengers
- Over 30 years project lifetime, the overall net benefit is:
 - 5.5 million tonnes of CO2
 - 5,000 tonnes of NOx
 - over £3bn
- The CO2 generated by the runway construction would be outweighed by the CO2 savings in a few years
- The savings are for ground holding for departing aircraft and airborne holding (stacking) for arriving aircraft, as well as fewer cancellations. The ENR also reduces some taxi distances
- The investment will support the Net Zero objective of the airport, help ensure compliance with regulatory limits (e.g. local air quality)

Methodology

- Methodology uses publicly available data such as FlightRadar24 and data published by the CAA
 - <https://www.caa.co.uk/Data-and-analysis>
- Traffic data based on activity in sample of summer 2019 days
 - Analysis assumes additional runway used to reduce traffic queues rather than increase movements
- Approach to estimating impact of additional capacity on delays is based on UK CAA Runway Resilience Study
 - www.whatdotheyknow.com/request/uk_caa_runway_resilience_study
- Reductions in ground taxi distances based on model of Heathrow layout
- Standardised values were used to derive carbon and financial benefits
 - E.g. Eurocontrol standard inputs:
www.eurocontrol.int/sites/default/files/publication/files/standard-input-for-eurocontrol-cost-benefit-analyses-2018-edition-8-version-2.6.pdf
 - E.g. WebTAG
<https://www.gov.uk/guidance/transport-analysis-guidance-tag>
- Air quality analysis based on:
 - Heathrow Airport 2013 & 2017 Emission Inventory
www.heathrowairwatch.org.uk/documents/Heathrow_Airport_2017_Emission_Inventory_Issue_1.pdf
 - Department for Business, Energy and Industrial Strategy: Final UK greenhouse gas emissions national statistics
data.gov.uk/dataset/9568363e-57e5-4c33-9e00-31dc528fcc5a/final-uk-greenhouse-gas-emissions-national-statistics

Heathrow Hub

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